

# Prosthodontic Rehabilitation of a Patient with Missing Teeth and Loss of Vertical Dimension Using Telescopic Overdentures

## Abstract

Overdentures are one of the most sought-after treatment options for patients with few remaining natural teeth. They are desired as they tend to preserve the natural teeth and its intact periodontium. This helps in reducing the residual ridge resorption and preserve proprioception. These characteristics offer better masticatory ability in patients rehabilitated with overdentures when compared to conventional complete dentures. Enhancements such as telescopic denture for better retention prove to be efficient clinically. Telescopic dentures enable frictional type of retention. This is a case report of a partially edentulous patient with decreased vertical dimension, successfully rehabilitated with telescopic denture in relation to the maxilla and fixed partial prosthesis in the mandibular region.

**Keywords:** Crown lengthening, overdenture, telescopic overdenture, tooth wear

## Introduction

Loss of teeth in an individual can be due to various causes, namely dental caries, periodontal disease, trauma, and/or malignancy. Nowadays, increasing age and loss of teeth do not necessarily go hand in hand. In the past, alveolar ridge resorption and a decrease in neuromuscular skills made it difficult in manipulating complete dentures. The impairment in dentition jeopardizes nutrition and overall quality of life. The presence of teeth aids in mastication, phonetics, and esthetics.<sup>[1]</sup>

The replacement of lost dentition is done with removable or fixed dental prosthesis (FDP). Fixed prosthesis is the most commonly advocated treatment over removable in the present scenario. A range of options in fixed prosthesis is available from conventional tooth-supported to implant-supported FDP. Even though dental implants have several advantages when compared to tooth-supported FDP, the surgical intervention and excess cost of treatment make conventional FDP a more preferred treatment option. When a patient has fewer remaining teeth, overdenture prostheses have a place to stay, which is a reflection of population trends and the demand for a better treatment. Tooth-supported overdenture prosthesis

has several advantages including improved proprioception, reduced rate of resorption, increased stability and retention, better masticatory performances, reduced palate and flanges, and improved phonetics.<sup>[2]</sup>

Tooth wear is the term used to describe the progressive loss of a tooth's surface due to actions other than those which cause tooth decay or dental trauma. Tooth wear increases with age. The amount of tooth wear seen currently is considerably greater than in the past due to the fact that more people are now retaining their natural teeth into old age. Tooth wear is caused by three phenomena: erosion, attrition, and abrasion. Attrition is a common phenomenon occurring during the lifetime of a person. Attrition may be caused due to congenital anomalies and parafunctional habits. Increased occlusal attrition leads to occlusal disharmony, pulpal pathologies, bone resorption,<sup>[3]</sup> and impaired function.

Turner and Missirlian classified patients based on their tooth wear:

- Category 1: Excessive wear with loss of vertical dimension of occlusion (VDO)
- Category 2: Excessive wear without loss of VDO but with space available
- Category 3: Excessive wear without loss of VDO but with limited space.

In a typical Category 1 patient (loss of VDO), the closest speaking space is more

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than 1 mm and the interocclusal space is more than 4 mm and has some loss of facial contour that includes drooping of the corners of the mouth. The reliable method to confirm the diagnosis and to determine a physiologic VDO is placement of trial restorations. At first, a removable splint or partial denture is placed and observed periodically for 6–8 weeks. Fixed provisional restorations are placed for another 2–3 months before planning permanent restorations. In such patients, all teeth of one arch must be prepared in a single sitting once the final decision is made. This makes the increase in VDO less abrupt and allows better control of esthetics.

Patients in Category 2 typically have a long history of gradual wear caused by bruxism, moderate oral habits, or environmental factors. In these patients, the occlusal vertical dimension (OVD) is maintained by continuous eruption. Tooth preparation to establish retention and resistance form may be critical because of shorter crown length. Gingivoplasty may be needed to gain clinical crown length. Enameloplasty of opposing posterior teeth may provide some space for the restorative material.

In patients of Category 3, there is excessive wear of anterior teeth, which has occurred over a long period, and there is minimal wear of the posterior teeth. Centric relation and centric occlusion are coincidental with the closest speaking space of 1 mm and an interocclusal distance of 2–3 mm. In such cases, vertical space must be obtained for restorative materials. This can be accomplished by orthodontic movement, restorative repositioning, surgical repositioning of segments, and programmed OVD modification.

Rehabilitation of the lost dentition enhances the quality of life of the individual. Physiologic functions are restored to the individual. Restoration of missing and attrited teeth requires a knowledge about the vertical dimension of the patient. The existing VDO has to be assessed, following which it is critical to verify the loss of OVD before the restoration is made to an increased OVD. Patients with severe tooth wear may need extensive restorative procedures to achieve appropriate function, esthetics, and comfort.

The different techniques that can be used to determine the patient's OVD are:

### Phonetics

Both Pound and Silverman have described the reliability of the speaking space as a method to determine OVD for complete denture patients. The normal mandibular position during the 's' sound places the incisal edge of the mandibular incisors about 1 mm inferior and lingual to the incisal edge of the maxillary incisors. Vertical positioning significantly more than 1 mm apart may indicate lost OVD.<sup>[4]</sup>

### Use of interocclusal distance

Methods of measuring interocclusal distance are diverse, inaccurate, and inconsistent. Measurements can be used as supplemental diagnostic aids, and they are to be used as mere guidelines.<sup>[4]</sup>

### Evaluation of soft-tissue contours

Diminished facial contour, thin lips with narrow vermilion borders, and drooping commissures are associated with overclosure. However, wrinkling and loss of facial contour are normal aging processes, and one must not attempt to correct these changes by increasing the OVD.

Since none of the above techniques are found to be scientifically as accurate as they claim, the use of more than one technique of evaluation of OVD may increase the accuracy and reliability. Increasing the OVD to achieve space for restorative materials is seldom advisable, but if deemed necessary, the increase should be minimal and used for restorative needs only.

This case report discusses the technique for rehabilitating a patient with missing teeth and loss of VDO in the remaining dentition.

### Case Report

A 60-year-old male patient reported to the Department of Prosthodontics at SRM Dental College and Hospital, Ramapuram, Chennai, Tamil Nadu, India. His chief complaint included missing teeth in the upper and lower right and left back tooth region. The patient expectation was to improve his facial appearance. On extraoral examination, no gross asymmetry was detected.

On intraoral examination, the patient was partially edentulous with only 11, 12, 15, 22, 24, and 25 in the maxillary arch and 31, 32, 33, 34 (root stump), 35, 42, 43, and 46 in the mandibular arch [Figure 1]. Generalized attrition was observed in all teeth. The vertical dimension at rest was measured as 65 mm. There was a 5-mm loss of vertical dimension due to attrition. A patient was categorized loss in vertical dimension as type 2, according to Missirlian and Turner classification. Radiographic examination revealed root canal treatment done in 11, 12, 15, 22, 24, and 25 [Figure 2].

The treatment options discussed with the patient were extraction of remaining teeth and to undergo conventional single complete denture in the maxilla and metal-ceramic FDP in the mandibular arch or tooth-supported overdenture in the maxillary arch or telescopic overdenture in the maxillary arch.

The final treatment plan chosen for the patient included a telescopic maxillary overdenture and metal-ceramic FDP in the mandibular arch. Since the existing clinical crown height was not satisfactory, crown lengthening procedure was advised.



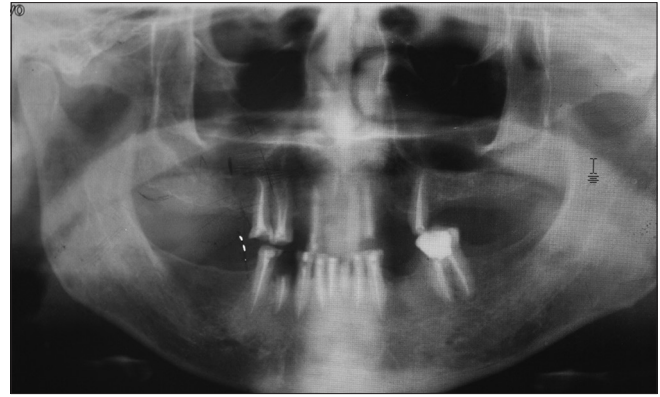
**Figure 1: Extra oral patient photograph**

A telescopic crown consists of a primary coping which is permanently cemented to the abutment and a detachable secondary telescopic crown connected to the prosthesis. The copings protect the abutment from dental caries and thermal irritation and provide retention and stabilization to the secondary crown. The secondary crown engages the primary coping to form a telescopic unit and serves as an anchor for the prosthesis. The tapered configuration of the contacting walls generates a compressive intersurface tension based on wedging action. The average wall taper commonly has a 6° angle. The copings were milled to required configurations of taper angles to create a common path of insertion for the retrievable superstructure.

## Methods

A diagnostic impression of the maxilla and mandible was made with irreversible hydrocolloid (Zelgan Plus, Dentsply India Pvt. Ltd, Gurgaon), and other diagnostic records for documentation were made. In accordance with the treatment plan, the patient was advised for crown lengthening procedure using laser [Figure 3] (dental diode laser, Picasso model, USA). Postcrown lengthening, primary impression was made using irreversible hydrocolloid (Zelgan Plus, Dentsply India Pvt. Ltd, Gurgaon) and cast was made using type III gypsum (Kalabhai Kalstone, Mumbai, India). A facebow transfer was done [Figure 4], and the maxillary cast was transferred to Hanau articulator. The mandible cast was mounted to the articulator with the occlusal registration record (Virtual Refill Bite Registration, Ivoclar, USA).

Tentative jaw relation was done with provisional denture base and occlusal rims for evaluating the vertical dimension and space availability for the restoration. The treatment plan involved increasing the vertical dimension by 5 mm. A temporary partial denture was fabricated in the maxillary and mandibular arches to establish a desired vertical dimension. The patient was asked to wear the partial denture for 4 weeks, following which the vertical dimension was re-evaluated for patient comfort and esthetics.



**Figure 2: Preoperative radiograph**

On satisfactory acceptance of provisional removable denture, the definitive treatment procedure on telescopic denture and mandibular FDP were initiated. Tooth preparation for overdenture copings in relation to 12, 14, 15, 21, and 25 [Figure 5] was done. Gingival retraction and definitive impression were made using polyvinyl siloxane impression material (Aquasil R, Dentsply, USA). Simultaneously, tooth preparation was done for mandibular teeth FDP (41, 42, 43, 45, 32, 33, and 36) [Figure 6] and impression made with polyvinyl siloxane material (Aquasil R, Dentsply, USA). The mandible FDP was fabricated. Metal try-in was done to evaluate the fit of the castings [Figure 7], and the constructed metal-ceramic FDP was luted in relation to 41, 42, 43, 45, 32, 33, and 36 [Figure 8].

Primary overdenture copings were luted with glass-ionomer cement (GC India) [Figure 9]. The impression for secondary coping was made with polyvinyl siloxane impression material (Aquasil R, Dentsply, USA), and cast was poured using type IV gypsum product. The wax pattern was made for secondary copings and casted. The passive fit of the secondary metal copings over the primary metal copings was verified. A pickup impression with secondary telescopic crowns was made with polyvinyl siloxane impression material (Aquasil R, Dentsply, USA) [Figure 10]. Master cast was poured using type III gypsum product. Denture base was fabricated connecting all secondary copings. The occlusal rims were made over the denture base to record the maxillomandibular relationship. The wax try-in [Figure 11] was done to evaluate function and esthetics. The maxillary overdenture was fabricated connecting the secondary metal copings. [Figure 12] and the processed overdenture was given to the patient. The postoperative clinical [Figure 13] and radiographical evaluation [Figure 14] was done.

## Discussion

The replacement of missing teeth enhances the quality of life of the individual. Partially edentulous situations may be rehabilitated using conventional removable dentures or implant-supported prosthesis.<sup>[2]</sup> Owai *et al.*<sup>[5]</sup> reported that decreased retention and stability in removable denture is





Figure 3: Crown lengthening of abutment teeth using laser

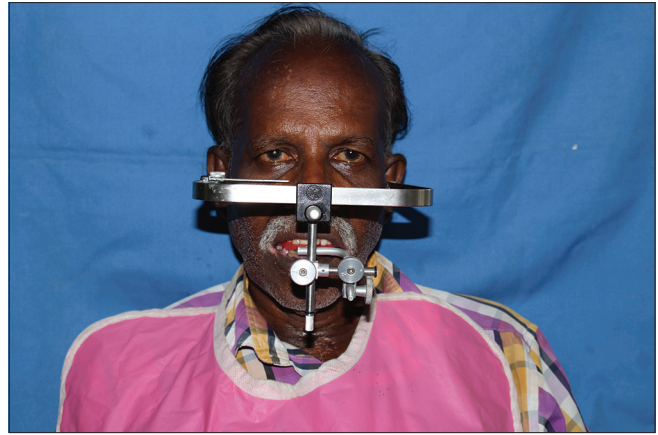


Figure 4: Face bow transfer



Figure 5: Tooth preparation in relation to 11,15,22,24 and 25



Figure 6: Tooth preparation in relation to 31,32,34,35,42,43 and 46



Figure 7: Metal try -in ( mandibular arch)



Figure 8: Metal ceramic fixed dental prosthesis mandible arch

compromised and it is less preferred by patients. The cost involved in implant therapy makes the patient search for an alternative treatment option which is more cost-effective as well as easy to use.

The masticatory efficiency, proprioception, support, retention, and stability increase with telescopic overdentures. Multiple abutments along the dental arch (bilateral) are indications for telescopic prostheses. Retained portion of

the root enhances the stability to telescopic prosthesis and proprioception also increases as their periodontal fibers are intact.<sup>[6-9]</sup> The forces is distributed along the long axis of the abutment teeth and reduces stress on the residual ridge. Weak abutments were suitable for overdentures rather than for FDP or removable dental prosthesis.<sup>[10,11]</sup>

Retention and stability of removable prosthesis is compromised in resorbed alveolar ridge situations. <sup>[6,12]</sup>



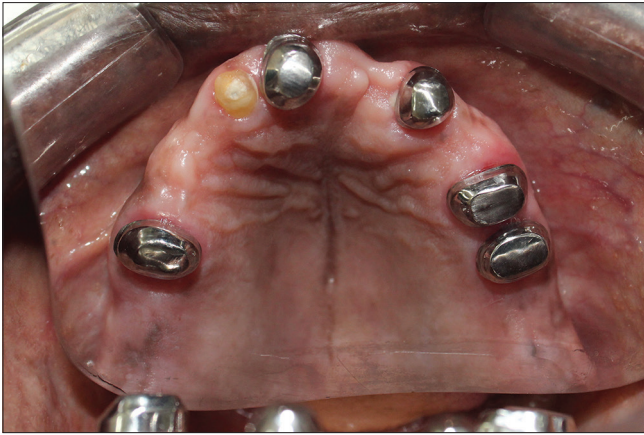


Figure 9: Primary coping in maxilla



Figure 10: Impression to fabricate secondary coping and maxillary denture



Figure 11: Secondary coping in denture



Figure 12: Wax try in



Figure 13: Post operative – Intra oral

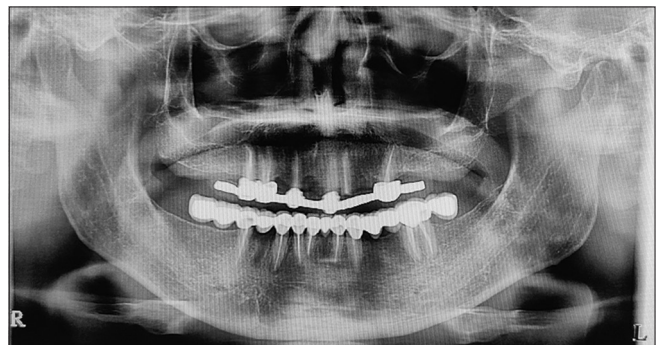


Figure 14: Post operative radiograph

Overdenture treatment plan aids in retaining the roots of the natural teeth and thus aid in maintaining the proprioception. Additionally, the biomechanical forces stimulate the periodontal fibers in deposition of bundle bone. These mechanisms reduce bone resorption and preserve the alveolar ridges.<sup>[3,13]</sup> The decreased vertical bone loss in mandibular telescopic overdenture was also observed and substantiated by Mahoorkar *et al.*<sup>[13]</sup>

Retrievability is the most common advantage of telescopic prosthesis. If the remaining dentition is in a state of transition, abutments splinted with FDP can be a problem. Any modifications can be altered in a telescopic prosthesis without compromising the entire prosthesis.<sup>[10]</sup>

The follow-up studies of 5–10 years reported that the crown-retained partial dentures have a lower failure than the precision attachments.<sup>[8]</sup> Patients were instructed on cleaning of the telescopic overdenture.

## Conclusion

Telescopic overdenture provides superior retention, stability, support, and proprioception than a conventional removable denture. Chewing efficiency and phonetics were increased with telescopic overdenture. It also decreases the rate of residual ridge resorption due to better stress distribution and by conversion of compressive forces into tensile forces. Even with the increased use of implants for overdenture therapy, tooth/root-supported telescopic overdenture still remains an excellent treatment modality.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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